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Effect of soil and foliar application of nutrients on post-harvest studies of cluster bean

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Abstract
The present investigation entitled *"*Effect of soil and foliar application of nutrients on post-harvest studies of Cluster bean*"*. The experiment was conducted on the Research Farm, College of Agriculture, Gwalior (M.P.). The topography of the field was uniform with proper drainage. The experiment was laid out in the randomized block design with 10 treatments and each treatment was replicated three times. The observations were recorded on different aspects of number of pods/plant, pod length, number of seeds/pod and test weight and seed yield as well as stover yield/plant. The result of experiment revealed that the NPK (18:18:18) 1% spray at flower initiation and 10 days after 1st spray significantly improved post-harvest parameters among all the treatments.

Keywords: Soil, foliar, nutrient and cluster bean

Introduction
Cluster bean (*Cyamopsis tetragonoloba* L. Taub) commonly known as Guar, is a drought and high temperature tolerant, deep rooted *Kharif* annual legume of high social and economic significance. It is highly adaptable towards erratic rainfall have multiple industrial uses and it is one of the most significant crop in cropping system for farmers of arid areas. Guar is also grown in other parts of the world, like, Pakistan, USA, Australia, Brazil and South Africa. In India the productivity of cluster bean is very low. So, there is need to take proper agronomic practices to enhance the productivity of cluster bean and foremost important among them is soil and foliar application of organic and inorganic sources of nutrients exploiting genetic potential of crop. This is considered to be an efficient and economic method of supplementing part of nutrient requirement at critical growth stages of the crop. Foliar application is credited with the advantage of quick and efficient utilization of nutrients, elimination of losses through leaching, fixation and regulating uptake of nutrients by the plant. Since foliar nutrients usually penetrate the leaf cuticle or stomata and enters the cell facilitating easy and rapid utilization of nutrients. So, soil and foliar nutrition on cluster bean helps in achieving the optimum grain yield of cluster bean.

Material and Methods
The experiment was conducted on the Research Farm, College of Agriculture, Gwalior (M.P.). The topography of the field was uniform with proper drainage. The experiment was laid out in the randomized block design with 10 treatments and each treatment was replicated three times. The following treatment combinations involving as a soil application of PSB and KMB while foliar spray of NAA, MOP, DAP, NPK (18:18:18), zinc sulphate, thiourea, neem coated urea and salicylic acid were applied.

Result and Discussion
Each plant passes through the vegetative as well as reproductive phases of growth to complete its life cycle. Yield can be considered to be the final expression of the physiological and metabolic activities of plants and is governed by various factors. These yield-attributing factors have direct bearing on plant productivity and for increasing the yield that means the maximum number of pods/plant (113.30), pod length (5.93 cm), number of seeds/pod (8.30)

and test weight (33.78) and seed yield (15.87g) as well as stover yield/plant (38.83g) play an important role.

The application of NPK (18:18:18) 1% spray at flower initiation and 10 days after 1st spray (T_5) followed by T_{10} (Neem coated urea 1% + salicylic acid 75 ppm spray at flower initiation and 10 days after 1st spray), T_9 (PSB + KMB soil applied + NAA 20 ppm spray at flower initiation stage) and T_2 (PSB soil applied + NAA 20 ppm spray at flower initiation stage) brought significantly higher and proved to be significantly superior to the remaining treatments. The trend of increases in seed and straw yields obtained due to these treatments was exactly in accordance with the similar increases in the yield-attributing characters *viz.*, pods/plant, pod length, seeds/pod, test weight and seed yield/plant as well as increased vegetative growth.

The increases in yield-attributing characters and consequently the seed yield of cluster bean and other pulses as a result of soil and foliar application of nutrients have also been reported by many research workers, Shinde and Jadhav (1995) [4], Velayutham *et al.* (2003) [6], Sritharan *et al.* (2005) [5], Dixit and Elamathi (2007) [1], Mondal and Mondal (2012) [2], Rawat *et al.* (2013) [3].

Since yield is the resultant of additive and complementary effect of plant growth and yield attributing parameters and these yield attributing characters had better expression at higher availability of nutrients due to adequate quantity and balanced proportion of plant nutrient supplied during the crop growth period which ultimately led towards an increase in seed and straw yields.

Table 1

Treatments	Number of pods / plant	Pod length (cm)	Number of seeds / pod	Test weight (g)	Seed yield (g/plant)	Stover yield (g/plant)
T_1: Control (water spray).	88.63	4.26	6.59	28.87	10.96	24.59
T_2: PSB soil applied + NAA 20 ppm spray at flower initiation stage.	104.63	5.57	7.73	31.77	14.13	34.33
T_3: DAP 0.5% spray at flower initiation and 10 days after 1st spray.	97.50	5.33	7.50	31.41	13.90	32.03
T_4: MOP 0.5% spray at flower initiation and 10 days after 1st spray.	92.40	5.00	7.07	29.60	12.17	26.00
T_5: NPK (18:18:18) 1% spray at flower initiation and 10 days after 1st spray.	113.30	5.93	8.30	33.78	15.87	38.83
T_6: Zinc sulphate 0.25% spray at flower initiation and 10 days after 1st spray.	95.13	5.20	7.10	30.68	13.10	30.60
T_7: KMB soil applied + NAA 20 ppm spray at flower initiation stage.	100.73	5.53	7.67	31.51	13.97	33.07
T_8: Thiourea @ 500 ppm spray at vegetative and flowering stage.	96.40	5.27	7.20	31.14	13.73	31.33
T_9: PSB + KMB soil applied + NAA 20 ppm spray at flower initiation stage.	105.40	5.70	7.80	31.88	14.60	35.40
T_{10}: Neem coated urea 1%+salicylic acid 75ppm spray at flower initiation and 10 days after 1st spray.	109.53	5.87	8.03	32.74	14.97	37.37
S.E.(m)±	3.536	0.141	0.251	0.731	0.628	1.917
C.D. (at 5%)	10.507	0.419	0.746	2.172	1.867	5.694

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